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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/866,587	05/30/2001	Takehiko Nakai	35.C15390	4941

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EXAMINER

AMARI, ALESSANDRO V

ART UNIT PAPER NUMBER

2872

DATE MAILED: 06/09/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/866,587

Applicant(s)

NAKAI, TAKEHIKO

Examiner

Alessandro V. Amari

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 March 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 and 13/10 is/are rejected.
- 7) ☒ Claim(s) 11,12,13/11,13/12,14,15 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 2 and 4-9 are rejected under 35 U.S.C. 102(b) as being anticipated by Ophey et al US Patent 5,694,247.

In regard to claim 1, Ophey et al discloses (see Figure 1, 2) a diffractive optical element, comprising a grating structure (4, 5) having a periodic first blazed type grating portion (11, 12) and a periodic second blazed type grating portion (16, 17) which is arranged on a light exit side of the first blazed type grating portion as described in column 4, lines 5-7, wherein in at least one of the first type grating portion and the second blazed type grating portion, period grating section structures smaller than a used wavelength are arranged in a periodic manner as described in column 4, lines 10-45 and lines 63-66.

Regarding claim 2, Ophey et al discloses a diffractive optical element, wherein said diffractive optical element is structured such that within an entire region of used wavelengths, diffraction directions are made different from each other, depending upon a polarization direction of a light beam incident on said diffractive optical element, and a diffracted light is concentrated only to one predetermined diffraction order as described in column 4, lines 62-67 and column 5, lines 1-10.

Regarding claim 4, Ophey et al discloses that said diffractive optical element has a step-shaped grating portion as shown in Figure 2.

Regarding claim 5, Ophey et al discloses that the minute periodic structure of the grating portion is varied along the periodic direction of the grating portion as shown in Figure 4B and as described in column 5, lines 35-46 and as shown in Figure 7.

Regarding claim 6, Ophey et al discloses that said minute periodic structure varied along the periodic direction of said grating portion is varied every step of the grating stepped portions as shown in Figure 7.

Regarding claim 7, Ophey et al discloses that the minute periodic structure of the grating portion is varied in a grating thickness direction as shown in Figure 7.

Regarding claim 8, Ophey et al discloses that the minute periodic structure varied in the grating thickness direction is varied every step of the grating stepped portion as shown in Figure 7.

Regarding claim 9, Ophey et al discloses that said used wavelength range corresponds to a visible light range as described in column 4, lines 9-12 and column 7, lines 53-67 and column 8, lines 1-30.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-10 and 13/10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maeda et al US Patent 5,956,302 in view of Danziger et al US Patent 6,292,297.

In regard to claim 1, Maeda et al teaches (see Figure 1, 5, 14) a diffractive optical element, comprising a grating structure having a first grating portion (7a) and a second grating portion (7b) which is arranged on a light exit side of the first grating portion, wherein in at least one of the first type grating portion and the second blazed type grating portion, structures smaller than a used wavelength are arranged in a periodic manner as described in column 10, lines 55-57.

Regarding claim 2, Maeda et al teaches (see Figure 14) that said diffractive optical element is structured such that within an entire region of used wavelengths, diffraction directions are made different from each other, depending upon a polarization direction of a light beam incident on said diffractive optical element, and a diffracted light is concentrated only to one predetermined diffraction order as shown in Figure 14 and as described in column 11, lines 13-25.

Regarding claim 9, Maeda et al teaches said used wavelength range corresponds to a visible light range as described in column 11, lines 10-12.

Regarding claim 10, Maeda et al teaches (see Figure 14) a polarization converting element, wherein deflecting means is provided so that an emergence direction of one of a P-polarized light beam and an S polarized light beam which has undergone polarization-separation to be diffracted in a diffraction direction different depending on a polarization direction by said diffractive optical element is made

substantially coincident with an emergence direction of the other beam as shown in Figure 14 and as described in column 11, lines 13-24.

Regarding claim 13, Maeda et al teaches (see Figure 5) an optical member (3) is provided so that an incident direction of a light beam on said diffractive optical element is made substantially parallel to an emergence direction thereof.

However, in regard to claim 1, Maeda et al does not teach that the first and second grating portions are blazed or in regard to claim 3 that said minute periodic structure is constituted by one kind of material, or two kinds of materials, and occupation ratios of the respective materials within one period of said minute periodic structure are made different from each other along a periodic direction of said grating portion or in regard to claim 4, that said diffractive optical element has a step-shaped grating portion or in regard to claim 5, that the minute periodic structure of the grating portion is varied along the periodic direction of the grating portion or in regard to claim 6 that said minute periodic structure varied along the periodic direction of said grating portion is varied every step of the grating stepped portions or in regard to claim 7, that the minute periodic structure of the grating portion is varied in a grating thickness direction or in regard to claim 8, that the minute periodic structure varied in the grating thickness direction is varied every step of the grating stepped portion.

In regard to claim 1, Danziger et al does teach that the periodic grating portions are blazed as shown in Figures 2a, 2b.

Regarding claim 3, Danziger et al teaches that said minute periodic structure is constituted by one kind of material, or two kinds of materials, and occupation ratios of

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the respective materials within one period of said minute periodic structure are made different from each other along a periodic direction of said grating portion as described in column 2, lines 1-57, column 5, lines 11-67 and column 6, lines 1-31.

Regarding claim 4, Danziger et al teaches that said diffractive optical element has a step-shaped grating portion as shown in Figures 2a and 2b.

Regarding claim 5, Danziger et al teaches that the minute periodic structure of the grating portion is varied along the periodic direction of the grating portion as shown in Figures 2a, 2b and as described in column 2, lines 1-57, column 5, lines 11-67 and column 6, lines 1-31.

Regarding claim 6, Danziger et al teaches that said minute periodic structure varied along the periodic direction of said grating portion is varied every step of the grating stepped portions as shown in Figures 2a, 2b and as described in column 2, lines 1-57, column 5, lines 11-67 and column 6, lines 1-31.

Regarding claim 7, Danziger et al teaches that the minute periodic structure of the grating portion is varied in a grating thickness direction as shown in Figures 2a, 2b and as described in column 2, lines 1-57, column 5, lines 11-67 and column 6, lines 1-31.

Regarding claim 8, Danziger et al teaches that the minute periodic structure varied in the grating thickness direction is varied every step of the grating stepped portion as shown in Figures 2a, 2b and as described in column 2, lines 1-57, column 5, lines 11-67 and column 6, lines 1-31.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize the blazed grating portions as taught by Danziger et al in the diffractive optical of Maeda et al in order to optimize overall diffraction efficiency of the diffractive optical element.

Allowable Subject Matter

5. Claims 11, 12, 13/11, 13/12, 14 and 15 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

6. Claim 11 is allowable over the prior art for at least the reason that the prior art fails to teach or reasonably suggest, "a half-wave plate is provided in correspondence to one of a P-polarized light beam and an S-polarized light beam, which has undergone polarization-separation to be diffracted in a direction different depending upon polarization direction" as set forth in the claimed combination. Claims 13, 14 and 15 are also allowable since they are dependent on claim 11.

Claim 12 is allowable over the prior art for at least the reason that the prior art fails to teach or reasonably suggest, "diffractive optical element according to claim 2 is made substantially coincident with an emergence direction of the other beam and a half-wave plate is provided in correspondence to one of the P-polarized light beam and S-polarized light beam" as set forth in the claimed combination. Claims 13, 14 and 15 are also allowable since they are dependent on claim 12.

Claim 14 is allowable over the prior art for at least the reason that the prior art fails to teach or reasonably suggest, "toward modulating means for modulating the light

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beam on the basis of an image signal and the light beam modulated by said modulating means is projected onto a predetermined surface by a projection optical system" as set forth in the claimed combination. Claim 15 is also allowable since it is dependent on claim 14.

The prior art of record, Ophey et al, Maeda et al and Danziger et al teach a diffractive optical element comprising a grating structure having a first blazed type grating portion and a second blazed type grating portion which is arranged on a light exit side of the first blazed type grating portion, wherein in at least one of the first type grating portion and the second blazed type grating portion, structures smaller than a used wavelength are arranged in a periodic manner wherein the diffraction directions are made different from each other depending upon the polarization diffractions of the incident light beams and wherein the minute periodic structure has a step shaped grating portion that can be varied every step of the step shaped portions and that the emergent light of one of the polarized light beams is made substantially coincident with an emergence direction of the other beam and further comprising an optical member provided so that an incident direction of a light beam on said diffractive optical element is made substantially parallel to an emergence direction thereof and there is no motivation or teaching to modify this difference as derived.

Response to Arguments

7. Applicant's arguments filed 22 March 2004 have been fully considered but they are not persuasive.

The Applicant argues that the prior art, Ophey et al does not teach or suggest a grating structure having first and second periodic blazed type grating portions, with at least one of these grating portions having periodic grating section structures smaller than a used wavelength arranged in a periodic manner.

In response to this argument, Applicant's arguments fail to comply with 37 CFR 1.111(b) because they amount to a general allegation that the claims define a patentable invention without specifically pointing out how the language of the claims patentably distinguishes them from the references. Furthermore, the newly added term "periodic" is defined as "occurring at regular intervals" (see Merriam-Webster's Collegiate Dictionary, Tenth ed., 1999). As such, Figures 1 and 2 of Ophey et al clearly show and read on a first periodic blazed type grating portion (10) and a second periodic blazed type grating portion (15) wherein the grating portions have period grating section structures (as shown in Figure 2) smaller than a used wavelength and arranged in a periodic manner as described in column 4, lines 3-17 and in accordance with the definition of "periodic" as cited above.

The Applicant further argues that the prior art, Maeda et al in view of Danziger et al does not teach or suggest a grating structure having first and second periodic blazed type grating portions, with at least one of these grating portions having periodic grating section structures smaller than a used wavelength arranged in a periodic manner.

In response to this argument, Applicant's arguments fail to comply with 37 CFR 1.111(b) because they amount to a general allegation that the claims define a patentable invention without specifically pointing out how the language of the claims

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patentably distinguishes them from the references. The newly added term "periodic" is defined as "occurring at regular intervals" (see Merriam-Webster's Collegiate Dictionary, Tenth ed., 1999). Figures 2a and 2b of Danziger et al clearly show periodic blazed type grating portions and furthermore, Danzinger et al describes these grating portions or structures as periodic (see for example, column 1, lines 5-9 and column 4, lines 54-59) in accordance with the claim language.

Conclusion

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alessandro V. Amari whose telephone number is (571) 272-2306. The examiner can normally be reached on Monday-Friday 8:00 AM to 5:30 PM.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Dunn can be reached on (571) 272-2312. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

ava *am*
01 June 2004


MARK A. ROBINSON
PRIMARY EXAMINER